STATEMENT OF BASIS

For Proposed Permit Limits (Permit Renewal)

PERMITTEE: City of Shelby

PERMIT NO.: MT0031488

RECEIVING WATER: Medicine Rock Coulee

FACILITY INFORMATION:

Mailing Address: P.O. Box 743
Shelby, MT 59474

Contact: Bill Moritz, Superintendent

Telephone: (406) 434-5564

FEE INFORMATION

Number of Outfalls: one (1)
Type of Outfall: 001 - Treated domestic wastewater

I. Permit Status

This is a renewal Montana Pollutant Discharge Elimination System (MPDES) permit for the City of Shelby domestic wastewater treatment facility. This is the issuance of an individual permit for a minor facility. The previous permit was issued under the MPDES General Discharge Permit for domestic wastewater lagoons, authorization number MTG580006. Because of its population and design flow, the City of Shelby does not qualify for coverage under the General Discharge Permit.

The general discharge permit for domestic wastewater lagoons permit expired September 30, 2004. The permittee submitted application forms (EPA 1 and 2a) and fees on April 15, 2004. The permit was administratively extended on October 20, 2004.

II. Facility Information

a. Facility Description

The permittee operates a three-cell facultative lagoon. The lagoons are approximately five feet deep. The effluent control structure can be operated to draw from three levels within the top three feet of the third cell. Effluent is discharged to Medicine Rock Coulee, an ephemeral drainage to the Marias River (Figure 1). Discharge flow rate is measured with a V-notch weir after the final effluent control valves (Figure 2). The facility is operated as a

seasonal controlled discharge. The permittee operates the discharges approximately seven to eight months of the year, typically May through December.

Design criteria are given in Table 1. The current facility was last upgraded in 1984. The permittee has retained engineering services to complete some upgrades to the facility, including the likely addition of a fourth cell and biosolids removal. The addition of aeration is not a planned upgrade at present.

Table 1: Current Design Criteria Summary (Source: Thomas, Dean and Hoskins, Inc, 1985)

Facility Description: 3-celled facultative facility, no disinfection capabilities.	
Construction Date: 1964	Modification Date: 1984
Design Population: 3,322	Current Population: 3,216 (2000 Census)
Design Flow, Average (mgd): 0.348	Design Flow, Maximum Day (mdg): 0.357
Primary Cells: 2	Secondary Cells: 1
Number Aerated Cells: NA	Minimum Detention Time-System (days): 180
Design BOD Removal (%): unknown	Design BOD Load (lb/day): 0.16
Design SS Removal (%): unknown	Design SS Load (lb/day): 0.16
Influent Flow (mgd): 0.348	Source: O&M Manual
Collection System Combined [ ] Separate [X]	Estimated I/I: unknown
SSO Events (Y/N): none reported	Bypass Events (Y/N): yes
Disinfection (Y/N): no	Type: NA
Discharge Method: Controlled	
Sludge Storage: NA	
Sludge Disposal: NA	Permit Number: NA

Five lift stations are operated for the collection of wastewater. Four are city owned and one is county owned. Only the elementary and junior/senior high schools are hooked up to the county lift station. The private prison solely occupies one City-owned/operated lift station.

The US Census information shows the population of the City of Shelby increased by 473 residents, or 16.4%, from 1990 to 2000. This increase is most likely attributed to a private prison facility that was built in the late 1990's and began housing inmates in the fall of 1999. The prison's current population is 504 inmates (MT Department of Corrections, 2005). The facility was built to house 1,000 inmates. At present, the wastewater discharged from the prison is all domestic; no industrial processes occur at the prison. Water used by the prison is about 1.5 million gallons per month, or approximately 15% of the City's total demand.

The Department completed compliance inspections in June 2004 and December 2005. No permit violations were noted at the time of the June 2004 inspection. In December 2005, the permittee reported a bypass event that occurred in November 2005. A pump failure at a lift station caused the wetwell to over fill and backup into the collection line. The bypass occurred with the overflow of raw sewage from a nearby manhole. The sewage ran into the roadside ditch. The permittee was alerted to the situation by residents and responded by pumping out the wetwell and ditch with a City owned vac-truck. The faulty pump circuit was replaced and the permittee will be installing an alarm system for future pump failures. At the time of the inspection, the alarm system had been ordered but not installed.

b. Effluent Characteristics

A summary of the discharge is given in Table 2. The period of record is from January 2000 through December 2005.

Table 2: Summary of Discharge Data, million gallons per day (Period of record: January 2000 through December 2005)

Month	2000 30-day Average	2001 30-day Average	2002 30-day Average	2003 30-day Average	2004 30-day Average	2005 30-day Average
January	ND	ND	ND	ND	0.518	ND
February	ND	ND	ND	ND	ND	ND
March	ND	ND	ND	ND	ND	ND
April	ND	ND	ND	ND	ND	ND
May	0.027	0.086	0.471	0.482	ND	ND
June	0.131	0.279	0.619	0.648	0.181	0.333
July	0.364	0.170	0.480	0.360	0.066	0.396
August	0.004	0.151	ND	0.216	0.194	0.360
September	0.078	0.121	0.346	0.389	0.278	0.367
October	0.279	0.399	0.353	0.432	0.252	0.360
November	0.122	0.279	0.317	0.399	0.346	0.374
December	0.279	ND	0.374	0.446	0.331	0.360
Maximum	0.364	0.399	0.619	0.648	0.518	0.396
Minimum	0.004	0.086	0.317	0.216	0.066	0.333

Footnote: "ND" means the permittee reported "No discharge" on monthly DMR.

The previous permit required monthly reporting of flow, flow duration, biochemical oxygen demand (BOD_5), total suspended solids (TSS), nutrients, and fecal coliform bacteria. In January 2002, the Department granted the permittee's request for a reduction in the nutrient monitoring requirements. Fecal coliform bacteria monitoring was only

required when discharges occurred during July, August, and/or September. Results for the period of record January 2000 through June 2005 are presented in Table 3. To date, no influent samples have been collected and analyzed for BOD_5 and TSS.

Table 3: Effluent Characteristics for the Period of Record January 2000 through November 2005

Parameter	Location	Units	Previous Permit Limits (7-day / 30-day)	Minimum	Maximum	Average	Number of Samples
Flow, Daily Average	Effluent	mgd	NA	0.004	0.648	0.307	45
BOD_5	Effluent	mg/L	45/30	1.0	37.3	10.9	45
		lbs/day	NA	0.18	99.4	25.8	45
TSS	Effluent	mg/L	135/100	2.3	82.0	18.9	45
		lbs/day	NA	0.11	330	50.1	45
Fecal Coliform Bacteria	Effluent	#/100-mL	NA	1	284	6.6	16
Total Ammonia	Effluent	mg/L	NA	<0.01	14.3	6.59	15
Nitrate + Nitrite	Effluent	mg/L	NA	<0.05	1.38	0.44	15
Total Kjeldahl Nitrogen (TKN)	Effluent	mg/L	NA	2.80	26.10	11.25	15
Total Nitrogen	Effluent	mg/L	NA	0.50	26.1	11.1	15
		lbs/day	NA	0.51	52.3	14.8	15
Total Phosphorus	Effluent	mg/L	NA	0.02	5.27	2.47	15
		lbs/day	NA	0.05	10.6	3.29	15

Two BOD_5 exceedances have been reported by the permittee since January 2000. In May 2000, a value of 37.3 mg/L was reported for the 30-day average BOD_5. Correspondence from the permittee attributed the exceedence to seasonal turnover. A pre-discharge BOD_5 sample for June 2000 was 10.6 mg/L and June's 30-day average was reported as 9.3 mg/L. In June 2005, the 30-day BOD_5 was reported as 32 mg/L. Correspondence from the permittee did not provide explanation for the exceedence. A pre-discharge sample had been collected and was 24 mg/L and the July 2005 30-day BOD_5 was 16 mg/L.

For the period of record, no TSS limit exceedances have been reported. The maximum reported 30-day average TSS concentration was 82 mg/L in May 2003. Annual maximum 30-day average TSS concentrations are routinely reported in May or June.

The previous permit did not contain a limit for fecal coliform bacteria but required effluent monitoring. The highest fecal coliform bacteria value for the period of record was 284 colonies/100-mL in August 2000. Since then, the fecal coliform bacteria have ranged from 1 to 44 colonies/100-mL.

III. Proposed Technology-Based Effluent Limits (TBEL)

The Board of Environmental Review has adopted by reference 40 CFR 133 which sets minimum treatment requirements for secondary treatment or equivalent for publicly owned treatment works (POTW) (ARM 17.30.1209). Secondary treatment is defined in terms of effluent quality as measured by BOD_5, TSS, percent removal of BOD_5 and TSS, and pH. National secondary treatment requirements are described on 40 CFR 133 and incorporated into all municipal permits.

The secondary treatment requirement may be modified on a case-by-case basis for facilities that are eligible for treatment equivalent to secondary (TES, 40 CFR 133.101 (g)) for BOD_5, TSS, and/or percent removal. To determine if a facility is eligible for TES the facility must meet the requirements of 40 CFR 133.101(g), summarized as follows:

1) The 95th percentile of the 30-day BOD and TSS concentrations in a minimum 2-year period, excluding upsets, bypasses, operational errors and unusual conditions [40 CFR 133.101(f)] exceed the minimum levels established for secondary treatment requirement;
2) The treatment works utilizes a trickling filter or waste stabilization pond; and,
3) The treatment works utilizes biological treatment that consistently achieves a 30-day average of at least 65 percent removal [40 CFR 133.101(k)].

In addition to these requirements, the modification may not contribute to an exceedence of water quality standards or exceed the limits established in a permit issued prior to April 29, 1993 unless the Department has completed a nonsignificance determination (See Part IV). Waste stabilization ponds may include common biological treatment systems such as facultative, aerated, or aerobic lagoons.

In addition to TES, permitting agencies may give special consideration to treatment works that employ waste stabilization ponds as the primary method for treating wastes and for systems receiving less concentrated influent. Alternative State Requirements (ASR) may be applied as limits in permits for lagoon system if historic data indicates that the TES limits in cannot be achieved. The 30-day ASR for TSS in Montana is 100 mg/L and the 7-day limit is 135 mg/L.

Limits established in the previous permit applied the secondary treatment standard for BOD_5 and the Alternative State Requirement (ASR) for TSS (Table 3).

The rational for the proposed technology based effluent limits are as follows:

1) BOD_5 Limits: the 95th percentile based on the 30-day BOD_5 is 27.1 mg/L, for the period of record. The facility can meet and will have national secondary limits; and

2) TSS limits: TES will apply. The 95th percentile for the complete dataset for the period of record is 47.0 mg/L; seasonal maximums occur nearly every May on record.

3) The percent removal of TSS will be 65% year round, as required by 40 CFR 133.105(b).

Table 4. Proposed Technology-Based Effluent Limits

	Concentration (mg/L) (1)		Load (lbs/day) (1)	
Parameter	**7-day Average**	**30-day Average**	**7-day Average Load**	**30-day Average Load**
BOD_5	45	30	130	87
TSS	65	45	190	130
pH (s.u.)	Within the range of 6.0 to 9.0			
BOD_5 % removal	85%			
TSS % removal	65%			

(1) See Part V. of the permit for explanation of terms.

Load limits were calculated as follows:

Load (lb/day) = Design Flow (mgd) x Concentration (mg/L) x Conversion Factor (8.34).

BOD:
7-d Load = 0.348 mgd x 45 mg/L x 8.34 = 130 lbs/day
30-d Load = 0.348 mgd x 30 mg/L x 8.34 = 87 lbs/day

TSS:
7-d Load = 0.348 mgd x 65 mg/L x 8.34 = 190 lbs/day
30-d Load = 0.348 mgd x 45 mg/L x 8.34 = 130 lbs/day

Nondegradation

The permit does not authorize a new or increased discharge, as defined in ARM 17.30.702(16), and therefore is not subject to the criteria in ARM 17.30.715(1).

Load allocations are given in Table 5. These allocated loads were calculated for the previous permit and are based on the facility design. These allocations define baseline allocated loads for the facility. Any increase above this amount is subject to the provisions of Montana's Nondegradation Policy 75-5-303, MCA and ARM 17.30.705 *et seq*.

Actual annual loads given in Table 5 were calculated from self-monitoring data.

Table 5: Calculated Allocated and Annual Actual Loads

Parameter	Allocated Load (lbs/day)	Actual Annual Load (lbs/day)					
		2000	2001	2002	2003	2004	2005
BOD_5	95	12.2	15.3	30.3	43.3	24.5	30.2
TSS	317	31.8	27.9	75.7	85.8	31.0	48.3
Total Nitrogen	97	17.25	12.10	NA	NA	NA	NA
Total Phosphorus	24	2.64	4.04	NA	NA	NA	NA

III. Water-Quality Based Effluent Limits

a. Receiving Water

Treated wastewater is discharged to Medicine Rock Coulee, an ephemeral tributary to the Marias River. Medicine Rock Coulee is in the Marias 4th Hydrologic Unit Code (HUC) 10030203, defined by the United States Geological Survey (USGS).

The water-use classification for Medicine Rock Coulee is a "B-2", as defined in the Administrative Rules of Montana (ARM) 17.30.610. Waters classified B-2 are to be maintained suitable for drinking, culinary, and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply (ARM 17.30.624).

The wastewater treatment facility was built in the natural channel of Medicine Rock Coulee. The critical low flow, 7-day 10-year event (7Q10), of the receiving water is zero. From the point of the wastewater facility discharge, water present in Medicine Rock Coulee is effluent dominated (as per conversation with public works director during the 2005 compliance inspection). Upstream of the effluent discharge, flow in Medicine Rock Coulee is only in response to precipitation events. The coulee's drainage upstream of the wastewater lagoons was channelized and drains to the west of the facility and east of railroad tracks (Figure 1). Storm water from the City is routed through the channelized section of the coulee and converges with the discharged treated domestic wastewater approximately 400 feet downstream of the lagoon effluent control structure. Immediately downstream of the wastewater facility's effluent control structure, the receiving water resembles a wetland, rather than a defined fluvial channel. A defined channel begins downstream of the wetland area and continues approximately six miles to the Marias River.

Medicine Rock Coulee has not been listed on either the 1996 or subsequent 303(d) lists of impaired streams. The reach of the Marias River that contains the confluence of Medicine Rock Coulee (upstream of Tiber Reservoir to the Two Medicine-Cut Bank River convergence) was listed on the 1996 list as being impaired by nutrients, salinity/TDS/chlorides, and suspended solids. That portion of the Marias River has not been reassessed for subsequent 303(d) lists. A TMDL has not been prepared the Marias River watershed, including Medicine Rock Coulee.

b. Mixing zone

The receiving water is effluent dominated and the 7Q10 is zero; therefore, no instream dilution is available for mixing. Instantaneous mixing is assumed to occur. A mixing zone is not applicable for the receiving water.

c. Proposed Water Quality-Based Effluent Limits

Water Quality Based-Effluent Limitations - Permits are required to include water quality-based effluent limits (WQBELs) when technology-based effluent limits are not adequate to protect water quality standards (40 CFR 122.44, ARM 17.30.1344). ARM 17.30.637(2) requires that no waste may be discharged that either alone or in combination with other waste will violate any applicable water quality standard, including numeric and narrative standards.

Water quality standards applicable to ephemeral drainages are general treatment requirements specified by AMR 17.30.635 and 17.30.637. Specific water quality standards of ARM 17.30.620 through 17.30.629, as stated in ARM 17.30.637(6), do not apply to ephemeral drainages. The discharge must comply with the general prohibitions (narrative standards) of ARM 17.30.637(1) which require that state waters, including mixing zones, must be free from substances which will:

(a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines;
(b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials;
(c) produce odors, colors or other conditions as to which create a nuisance or render undesirable tastes to fish flesh or make fish inedible;
(d) create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life; and
(e) create conditions which produce undesirable aquatic life.

In order to comply with the narrative requirements of ARM 17.30.637(1)(d), prohibiting condition which are harmful to human, the permit will contain effluent limits based on the state water quality standard for *Escherichia coli*.

The permit will also require the permittee to monitor the effluent for whole effluent toxicity (WET) in accordance with ARM 17.30.1322(j). The permittee has not been required to monitor the effluent for WET, nor has the permittee reported the results of any WET testing. Therefore the permittee will be required to submit the results of this analysis to determine if a WET limit is applicable. WET monitoring requires as discussed in Part V. of the SOB.

Proposed WQBEL Limits:

***Escherichia coli* (*E. coli*) Limits –** The applicable standard for *E. coli* is:

1) April 1 through October 31, of each year, the geometric mean number of the microbial species *E. coli* must not exceed 126 colony forming units (cfu) per 100 milliliters (mL), nor are 10% of the total samples during any 30-day period to exceed 252 cfu per 100 mL (ARM 17.30.629(2)(a)(i)); and
2) November 1 through March 31, of each year, the mean number of *E. coli* organisms should not exceed 630 cfu per 100 mL and 10% of the samples during any 30-day period may not exceed 1,260 cfu per 100 mL (ARM 17.30.629(2)(a)(ii)).

The previous permit required fecal coliform bacteria monitoring during discharges that occurred in July, August, or September. Self-monitoring data show that the facility was capable of meeting the former fecal coliform limits used by the State prior to February 2006. *E. coli* is a subset of fecal coliform and the current standard is based on a direct correlation of fecal coliform to *E. coli* coliform. Fifteen of the 16 self-monitoring data for fecal coliform bacteria during the period of record were less than the fecal coliform bacteria standard. The maximum fecal coliform reported was 284 colonies/100-mL (Table 3).

IV. Proposed Effluent Limits

a. Outfall 001

Effluent Limitations: Outfall 001				
Parameter	Units	Average Monthly [1]	Average Weekly [1]	Maximum Daily [1]
Biological Oxygen Demand (BOD_5)	mg/L	30	45	--
	lbs/day	87	130	--
Total Suspended Solids (TSS)	mg/L	45	65	--
	lbs/day	130	190	--
E. coli – Summer [2, 3]	CFU/100-mL	126	--	252
E. coli – Winter [2, 3]	CFU/100-mL	630	--	1,260

Footnotes:
1. See Definition section, Part V of MPDES permit, for explanation of terms.
2. Summer is defined as April 1 through October 31; winter is defined as November 1 through March 31.
3. Report Geometric Mean if more than one sample is collected in the reporting period.

V. Monitoring Requirements

a. Outfall 001

Monitoring requirements in the permit are based on the type of treatment facility and the method of discharge (e.g. controlled). The permittee will monitor effluent discharge flow rate and quality at the V-notch weir down gradient of the effluent control structure (Figure 2). Influent samples will be collected from the open channel in the manhole at the influent control structure near the first cell (Figure 2). Influent samples are required every month, including when the facility is not discharging.

Acute WET monitoring is required during the fourth calendar year (2010) of the permit cycle. During the fourth year of the permit cycle, acute WET testing shall be performed quarterly, on two test species, the fathead minnow (*Pimephales promelas*) and the freshwater crustacean, C*eriodaphnia dubia*. The resultant data from these tests will be reported to the Water Protection Bureau with the submission of renewal applications. The data will be utilized to evaluate effluent toxicity and develop permit requirements in the next renewal cycle, if necessary.

Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type [1]
Flow	mgd	Influent	---	[2]
	mgd	Effluent	3/Week	Instantaneous
Flow, Duration of Event	days	Effluent	NA	Calculated
5-Day Biological Oxygen Demand (BOD_5)	mg/L	Influent [3]	1/Month	Composite
	mg/L	Effluent	1/Week	Composite
	% Removal [4]	NA	1/Month	Calculated
	lbs/day	Effluent	1/Month	Calculated
Total Suspended Solids (TSS)	mg/L	Influent [3]	1/Month	Composite
	mg/L	Effluent	1/Week	Composite
	% Removal [4]	NA	1/Month	Calculated
	lbs/day	Effluent	1/Month	Calculated
pH	s.u.	Effluent	1/Week	Instantaneous
Temperature	°C	Effluent	1/Week	Instantaneous
E. coli	No./100ml	Effluent	1/Week	Grab
Oil and Grease [5]	mg/L	Effluent	1/Quarter	Grab
Total Ammonia, as N	mg/L	Effluent	1/Quarter	Grab
Nitrate + Nitrite, as N	mg/L	Effluent	1/Quarter	Grab
Kjeldahl Nitrogen, Total, as N	mg/L	Effluent	1/Quarter	Grab
Total Nitrogen, as N [6]	mg/L	NA	1/Quarter	Calculated
	lbs/day	NA	1/Quarter	Calculated
Total Phosphorus, as P	mg/L	Effluent	1/Quarter	Grab
	lbs/day	NA	1/Quarter	Calculated
Total Dissolved Solids (TDS)	mg/L	Effluent	1/Quarter	Grab
Dissolved Oxygen	mg/L	Effluent	1/Quarter	Grab
Whole Effluent Toxicity, Acute [4]	% Effluent	Effluent	1/Quarter	Grab

Footnotes:
1. See Definitions, Part V. of MPDES permit, for explanation of terms.
2. See Part I.D. Special Conditions of MPDES permit.
3. Influent BOD and TSS samples shall be collected at the specified frequency even if no effluent discharge occurs in the monitoring period.
4. See narrative discussion in Part I.C. of MPDES permit for additional details.
5. Use EPA Method 1664, Revision A: N-Hexane Extractable Material (HEM), or equivalent.
6. Calculated as the sum of Nitrate + Nitrite (as N) and Total Kjeldahl Nitrogen (as N) concentrations.

VI. Special Conditions

Federal requirements given by 40 CFR 122.21(j)(2)(i) state that POTWs with a design flow greater than 0.1 mgd will provide inflow and infiltration (I/I) information during permit renewal. The renewal application (EPA Form 2A) for the next permit cycle requires information quantifying I/I and what, if any, steps the permittee is taking to minimize I/I. ARM 17.30.1322 requires any POTW with an effective permit to apply at least 180 days before the expiration data of the existing permit. Within 4 ½ years after permit effectiveness (before April 1, 2010), the permittee will complete an I/I investigation that meets the renewal application requirements. The results of the study will be included in the submittal of EPA Form 2A.

VII. Compliance Schedule

Not applicable at this time.

VIII. Other

Molloy Determination

On September 21, 2000, a U.S. District Judge issued an order stating that until all necessary total maximum daily loads (TMDLs) under Section 303(d) of the Clean Water Act are established for a particular water quality limited segment (WQLS), the State is not to issue any new permits or increases under the MPDES program. The order was issued in the lawsuit Friends of the Wild Swan v. U.S. EPA, et al. (CV 97-35-M-DWM), District of Montana and Missoula Division. The renewal of this permit does not conflict with Judge Molloy's order because this is not a new or increased discharge under MPDES.

IX. Information Sources

40 CFR, Parts 122, 136, July 1, 2000.

DEQ. Circular WQB-7, Montana Numeric Water Quality Standards. January 2004.

DEQ. ARM (Administrative Rules of Montana) 17.30.601-670. Montana Surface Water Quality Standards. June 2004.

DEQ. ARM 17.30.601-670. Montana Surface Water Quality Standards. February 2006.

DEQ. ARM 17.30.701-717. Nondegradation of Water Quality. June 1996.

DEQ. ARM 17.30.1201-1209, 17.30.1301-1387. Montana Pollutant Discharge Elimination System (MPDES). March 2003.

MCA (Montana Code Annotated), Title 75-5-101 *et seq*., "Montana Water Quality Act". 2003.

Montana Department of Corrections. Website address: http://www.cor.mt.gov/. Accessed December 30, 2005

NRIS. Website address: http://nris.state.mt.us/topofinder2/default.asp, accessed December 30, 2005.

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Date: September 2006

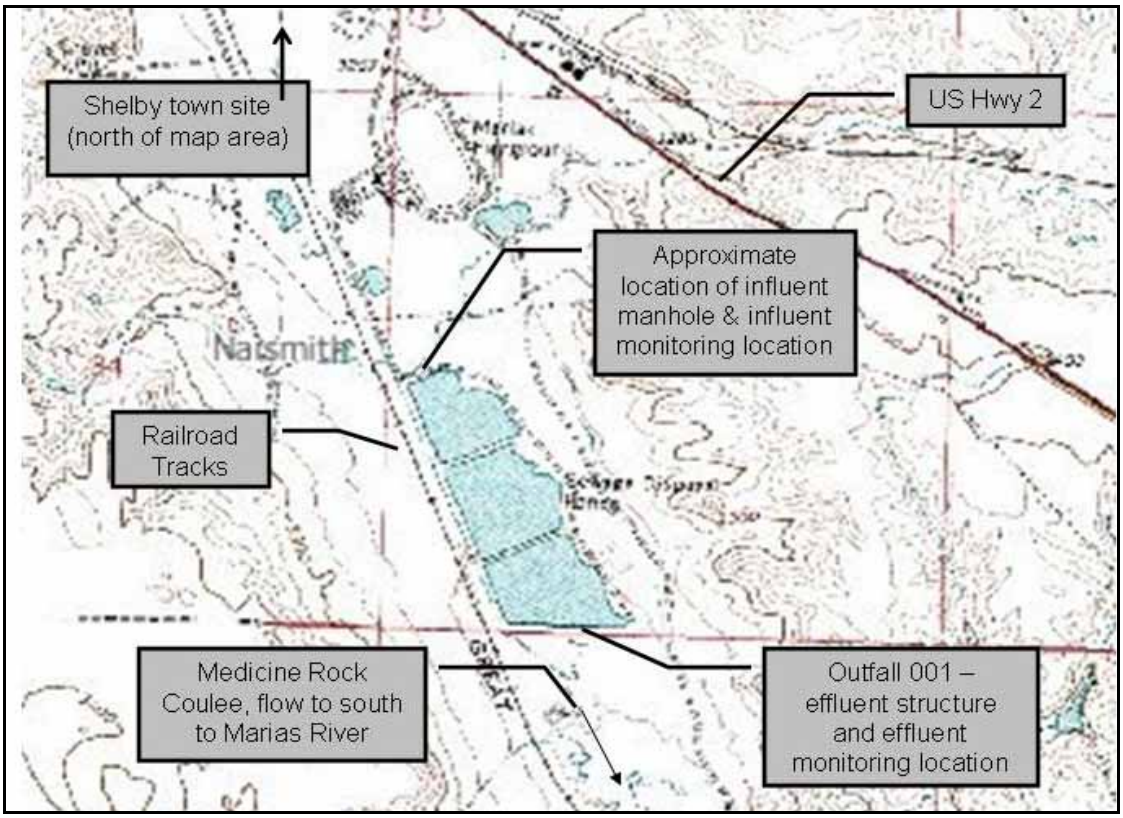

Figure 1: Site Map (NRIS, December 2005).

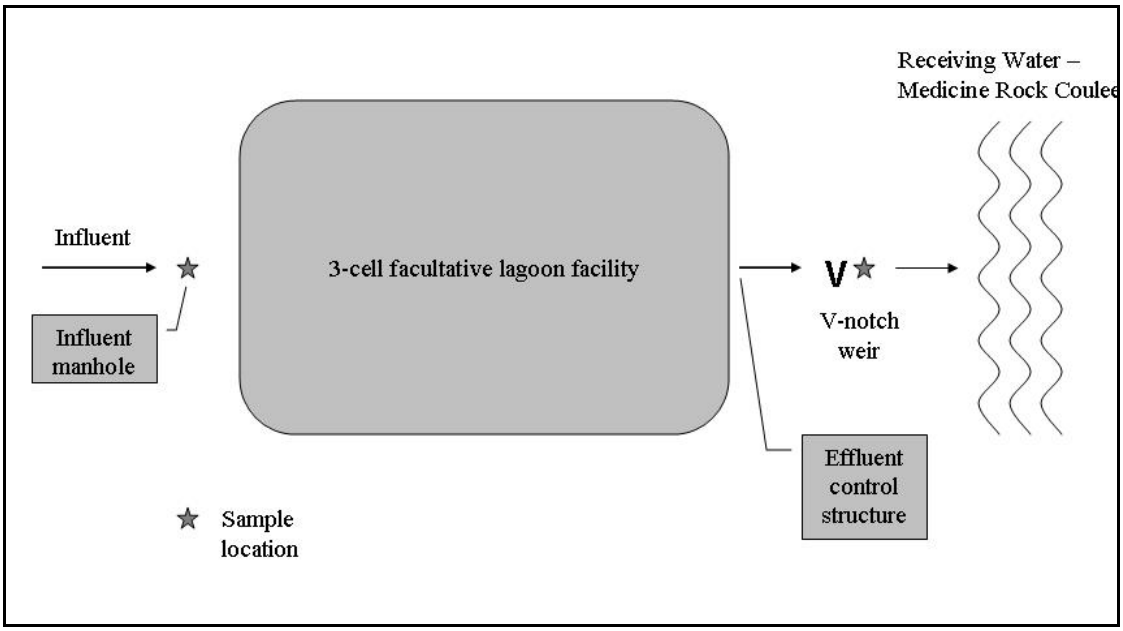

Figure 2: Flow diagram of treatment; stars mark sample locations.